

NASA TECH BRIEF



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Readout System for Radiation Detector

An improved electrical circuit, which has been designed, will determine the amount of light detected by a photomultiplier tube when its output signal is in the dark-current range of the tube. The low-intensity light to which the tube responds arises from a thermoluminescent dosimeter which has received ionizing radiation (e.g., X-rays or nuclear radiation) in the range of 10 to 500 milliroentgens. (A thermoluminescent dosimeter emits visible light when it is heated after exposure to the ionizing radiation.) To enable the detection and reliable measurement of very weak sources of light, it is necessary to reduce the dark current and thereby improve the signal-to-noise ratio of the resultant output signal. Previous methods of improving the signal-to-noise ratio, although effective, are relatively complex and often unreliable.

The new circuit utilizes a highly stable variable current source which, when combined with the dark current signal (no light signal fed into the photomultiplier tube), causes the resultant output signal of the circuit to be zero. Thus, when an input light signal is fed into the photomultiplier tube, with the current

source equal in magnitude but opposite in polarity to the dark current, the resultant output signal is proportional to the input signal. In this way, low-intensity light signals from a thermoluminescent dosimeter may be readily measured by the circuit.

Note:

Documentation is available from:
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Reference: B68-10501

Patent status:

This invention has been patented by NASA (U.S. Patent No. 3,358,145), and royalty-free license rights will be granted for its commercial development. Inquiries about obtaining a license should be addressed to NASA, Code GP, Washington, D.C. 20546.

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Category 01